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Stress detection in IT professional by image processing and machine learning

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Abstract- The main concept of this paper is to detect stress in the IT professionals with the help of Machine learning and Image processing techniques. This paper is an upgraded version of the old stress detection systems which excluded the live detection and the personal counseling but this paper comprises of live detection and periodic analysis of employees and detecting physical as well as mental stress levels in his/her by providing them with proper remedies for managing stress by providing survey form periodically. This paper mainly focuses on managing stress and making the working environment healthy and spontaneous for the employees and to get the best out of them during working hours.

Keywords- Stress Prediction, KNN Classifier, Facial Expressions, Deep Learning.

I. INTRODUCTION

Stress management systems play a major role to notice the stress levels that disrupts our socio-economic mode. As World Health Organization (WHO) says, Stress may be a psychological state drawback moving the lifetime of one in four voters. Human stress results in mental furthermore as socio-fiscal issues, lack of transparency in work, poor operating relationship, depression and eventually commitment of suicide in severe cases. This demands counselling to be provided for the stressed people cope up against stress. Stress turning away is not possible however preventive actions helps to beat the stress. Currently, solely medical and physiological consultants will verify whether or not one is beneath depressed state (stressed) or not. one in every of the normal methodology to notice stress is predicated on form.

This methodology, utterly depends on the answers given by the people, folks are going to be unsteady to mention whether or not they square measure stressed or traditional. Automatic detection of stress minimizes the chance of health problems and enhance the welfare of the society. This covers the manner for the need of a scientific tool, that uses physiological signals thereby automating the detection of stress levels in people. Stress detection is mentioned in varied literatures because it may be a vital social contribution that enhances the approach to life of people. Nowadays because IT industries square measure setting a replacement peek within the market by transferal new technologies and merchandise within the market. during this study, the stress levels in staff also are noticed to lift the bar high. Although their square measure several organizations United Nations agency give psychological state connected schemes for his or her staff however the problem is much from management. during this paper we have a tendency to try and go into the depth of this drawback by making an attempt to notice the stress patterns within the operating worker within the corporations we might prefer to apply image process and machine learning techniques to research stress patterns and to slim down the factors that powerfully verify the stress levels. Machine Learning algorithms like KNN classifiers square measure applied to classify stress. Image process is employed at the initial stage for detection, the employee's image is clicked by the camera that is input. so as to urge associate degree increased image or to extract some helpful info from its image process is employed by changing image into digital type and play acting some operations on that. By taking input as a picture from video frames and output is also image or characteristics related to that image. Image process primarily includes the subsequent 3 steps:

• Importing the image via image acquisition tools.
• Analysing and manipulating the image.
• Output within which result's altered image or report that's supported image analysis.

II. II. AIM AND OBJECTIVE

a) Aim

The paper aim is Stress detection in IT professional by image processing and machine learning is to Monitoring the emotional status of a person who is working in front of a computer for longer duration. To Detect and reduce stress and create a much comfortable workplace for IT employees. This system mainly focuses on managing stress and making the working environment healthy and spontaneous for the employees and to get the best out of them during working hours.

b) Objective

The general objective of the study is to propose a reliable, convenient and accurate detection system. The study has the following specific objectives:

- To predict stress in a person by the symptoms calculated by monitoring.
- To analyze the stress levels in the employee.
- To provide solutions and remedies for the person to recover his/her stress.

III. LITERATURE SURVEY

Paper 1: *Stress and anxiety detection using facial cues from videos*:

This study develops a framework for the detection and analysis of stress emotional states through video-recorded facial cues. A thorough experimental protocol was established to induce systematic variability in affective states (neutral, relaxed and stressed/anxious) through a variety of external and internal stressors. The analysis was focused mainly on non-voluntary and semi-voluntary facial cues in order to estimate the emotion representation more objectively [1].

Paper 2: *Detection of Stress Using Image Processing and Machine Learning Techniques*:

In this system a real-time non-intrusive video are captured, which detects the emotional status of a person by analyzing the facial expression. It detects an individual emotion in each video frame and the decision on the stress level is made in sequential hours of the video captured. The system employs a technique that allows system to train a model and analyze differences in predicting the features [2].

Paper 3: *Machine Learning Techniques for Stress Prediction in Working Employees*:

In this paper, the system applies machine learning techniques to analyze stress patterns in working adults and to narrow down the factors that strongly determine the stress levels. Various Machine Learning techniques were applied to train our model after due data cleaning and preprocessing.[3].

IV. EXISTINGSYSTEM

Existing system is developed for stress detection based on the study of the facial expression. The system is non-intrusive and is able to run in real-time. This system consists some Image Processing and Machine Learning Techniques. And the other work on this issue is based on various physical signals and visual features to monitor the stress in a person while he is working. However, these measurements are invasive and are less comfortable in real application. Every sensor data is compared with a stress index which is a threshold value used for detecting stress[1] .

V. COMPARTIVE STUDY

SR NO.	PAPER TITLE	AUTHOR NAME	METHOD	ADVANTAGE	DISADVANTAGE
1.	Stress and anxiety detection using facial cues from videos	G. Giannakakis, D. Manousos, F. Chiarugi	Face ROI detection, Data Preprocessing.	a variety of semi voluntary facial features are jointly used for the detection of anxiety and/or stress instead of the traditional facial expression analysis,	Time Consuming
2.	Detection of Stress Using Image Processing and Machine Learning Techniques	Nisha Raichur, Nidhi Lonakadi, Priyanka Mural	Image Pre-Processing.	Integrates image processing and deep learning to detect ongoing stress to minimize future health risks	Difficult to implement on larger areas.
3.	Machine Learning Techniques for Stress Prediction in Working Employees	U. S. Reddy, A. V. Thota and A. Dharun	Logistic Regression, Decision Tress, Random Forest Classifier.	customize the survey taken in order to procure responses in the right format and to increase the number of attributes as per relevance.	vast dataset is needed to accomplish
4	Classification of acute stress using linear and non-linear heart rate variability analysis derived from sternal ECG	Tanev, G., Saadi, D.B., Hoppe, K., Sorensen, H.B	Naive Bayesian classifier.	Standardizing non-linear HRV features for each subject	Little Bit time Consuming

VI. PROBLEM STATEMENT

Image Capturing is done automatically so it captures images when any usual activity happens. It will mislead the detection system. If any distortion occurs while capturing the image then the system will give inappropriate results. Continues capturing of images creates large unusable datasets. Due to the auto captured image datasets detection will get more time consuming or inaccurate.

VII. PROPOSED SYSTEM

Stress detection system based on the analysis of the facial expression. The system works when the IT professional will be seat in the front of camera then it will be able to detect

the facial expression and run in real-time. A camera is used to capture the near front sight of the employee while he is working in front of the computer. Captured video is divided into sections of equivalent length and set of similar number of image frames are extracted from each part correspondingly and are examined. The image detection includes the calculation of the variation in the place of the eyebrow from its mean position. The displacement of eyebrow from its place is considered by examining the image for the eyebrow co-ordinates. If the employee is found stressed in the successive sections of time intervals which was previously divided, the decision for stress detection is formed for a employee working in front of computer with the obtained results it employs the technique of deep learning. The stress detection module scans the binary image from the extreme left top to record the co-ordinates of the eyebrow. The stress detection module scans the binary image from the extreme left top to record the co-ordinates of the eyebrow. The offline displacement calculation sub-module calculates the shifting of eyebrow using the obtained eyebrow co-ordinates which is subsequently followed by variance calculation of the displacement. The classifier sub-module is trained offline are employed to determine the presence of emotion. The integrated decision of individual frames eventually determines the level of stress involved.

VIII. ALGORITHM

The general idea of working of proposed system algorithm is given as follow:

1. Algorithm For Image Upload

Step 1: Start
Step 2: Login of Employee.
Step 3: Check If the IT Employee is existing or not.
Step 4: If not then signup.
Step 5: Goto step 2.
Step 6: If yes then Employee will login.
Step 7: Algo Upload Image {
return render(request, 'users/UserImageUploadForm.html', {'data': data})
}
Step 8: Algo UploadImageAction(request):
image_file -> request.FILES['file']
messages.error(request, 'THIS IS NOT A JPG FILE')
fs -> FileSystemStorage()
 # detect_filename -> fs.save(image_file.name, image_file)
uploaded_file_url -> fs.url(filename)
obj -> ImageExpressionDetect()
emotion -> obj.getExpression(filename)
Step 9: Algo UserEmotionsDetect(request):
imgname -> request.GET.get('imgname')
obj -> ImageExpressionDetect()
emotion -> obj.getExpression(imgname)
data -> UserImagePredictinModel.objects.filter(loginid->loginid)
return render(request, 'users/UserImageUploadForm.html', {'data': data})
Step 10: Algo UserLiveCameDetect(request):
obj -> ImageExpressionDetect()
obj.getLiveDetect()
return render(request, 'users/UserLiveHome.html', {})
Step 11: Algo UserKnnResults(request):
obj -> KNNclassifier()
df,accuracy,classificationerror,sensitivity,Specificity,fsp,precision -> obj.getKnnResults()
data -> df.to_html()
return render(request,'users/UserKnnResults.html',{'data':data,'accuracy':accuracy,'classificationerror':classificationerror,'sensitivity':sensitivity,"Specificity":Specificity,'fsp':fsp,'precision':precision})
Step 12: Stop

2. Deep Learning

Step 1: Start
Step 2: get the Trained Data sets
Step 3: Algo emotion detection {
emotion_dict -> {0: "Angry", 1: "Disgusted", 2: "Fearful", 3: "Happy", 4: "Neutral", 5: "Sad", 6: "Surprised"}
Step 4: Start webcam feed
cap -> cv2.VideoCapture(0)
Step 5: Captured video will be converted into the greyscale Image.
ret, frame -> cap.read()
facecasc -> cv2.CascadeClassifier('haarcascade_frontalface_default.xml')
faces -> facecasc.detectMultiScale(gray,scaleFactor->1.3, minNeighbors->5)
Step 6: Rectangle will be mapped on the face.
cv2.rectangle(frame, (x, y-50), (x+w, y+h+10), (255, 0, 0), 2)
roi_gray -> gray[y:y + h, x:x + w]
cropped_img -> np.expand_dims(np.expand_dims(cv2.resize(roi_gray, (48, 48)), -1), 0)
Step 7: Deep learning algorithm will be predict the result with help of trained data.
prediction -> model.predict(cropped_img)
maxindex -> int(np.argmax(prediction))
Step 8: Display result
cv2.putText(frame, emotion_dict[maxindex], (x+20, y-60), cv2.FONT_HERSHEY_SIMPLEX, 1, (255, 255, 255), 2, cv2.LINE_AA)
}
Step 9: Stop

IX. MATHEMATICAL MODEL

1. Data Generation

Looking to image preprocessing example in Keras, you often see image is scaled down by factor 255 before feeding to the model.

test_datagen=ImageDataGenerator(rescale=1./255)
It Will generate the data and store in train_generator variable
train_generator=train_datagen.flow_from_directory(
train_dir,
target_size=(48,48),
batch_size=batch_size,
*color_mode="**grayscale**",*
*class_mode='**categorical**')*

2. Emotion Detection

(a) dictionary which assigns each label an emotion (alphabetical order)
emotion_dict = {0: "Angry", 1: "Disgusted", 2: "Fearful", 3: "Happy", 4: "Neutral", 5: "Sad", 6: "Surprised"}

(b) Multiscale detects objects of different sizes in the input image and returns rectangles positioned on the faces.
faces-> *facecasc.detectMultiScale(gray,scaleFactor->1.3,minNeighbors->5)*

(c) This function returns 4 values: the x and y location of the rectangle, and the rectangle's width and height (w , h).
for (x, y, w, h) in faces: cv2.rectangle(frame, (x, y-50), (x+w, y+h+10), (255, 0, 0), 2)

(d) Here we are setting roi_gray to be our region of interest. That's where we will look for the eyes.
roi_gray -> gray[y:y + h, x:x + w]

(e) This prediction stored in max index will check in the emotion_dict with index number
cv2.putText(frame,emotion_dict[maxindex],(x+20 ,y-60), cv2.FONT_HERSHEY_SIMPLEX, 1, (255, 255, 255), 2, cv2.LINE_AA)

X. SYSTEM ARCHITECTURE

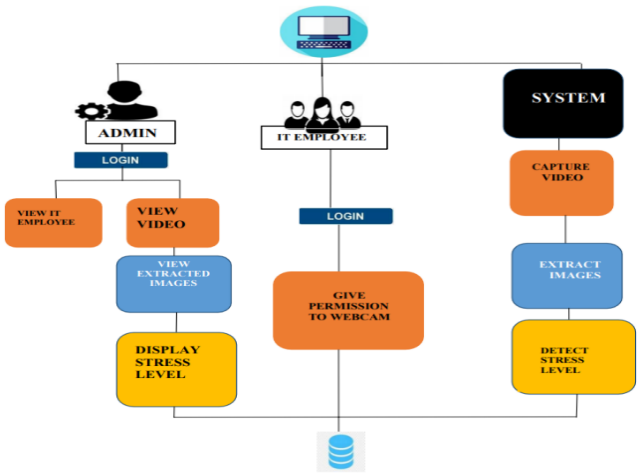

Fig.1: System Architecture

Description:

System Arcitecture is divided into 3 modules-

1. First module shows Registration of Administrator with Access to IT Employee Data, and management of Every activity on application

2.Second Module includes IT Employee Login and allows the access to webcam feature to see there stress level and health related data.

3. Third Module includes the actual working model having features of webcam videos, Image Extraction ,and Detection of stress levels from Videos of IT Employee thus calculating the necessary measures.

XI. ADVANTAGES

- Output in which result is modified image or report that is based on image analysis.
- Stress Detection System enables employees with coping up with their issues leading to stress by preventative stress management solutions.
- We will capture images of the employee based on the regular intervals and then the tradition survey forms will be given to the employees.

XII. DESIGN DETAILS

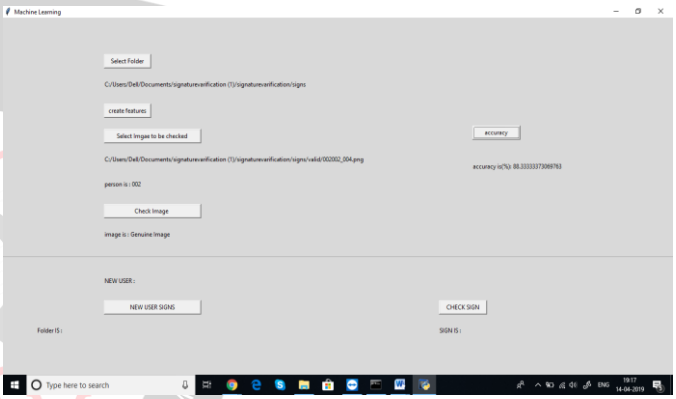

Fig 2: Result

XIII. CONCLUSION

Thus, we have implemented the paper G. Giannakakis, D. Manousos, F. Chiarugi, "Stress and anxiety detection using facial cues from videos", IEEE January 2017 and according to implementation and conclusion to predict stress in the employees by observing the captured images of authenticated users which makes the system secure. The image is captured automatically when the authenticate user is logged in based on some time interval. The captured images are used to detect the stress of the user based on some standard conversion and image processing mechanisms. Then the system will analyze the stress levels by using Machine Learning algorithms which generates the results that are more efficient.

REFERENCE

[1] G. Giannakakis, D. Manousos, F. Chiarugi, "Stress and anxiety detection using facial cues from videos," Biomedical Signal processing and Control", vol. 31, pp. 89-101, January 2017.

[2] Nisha Raichur, Nidhi Lonakadi, Priyanka Mural, "Detection of Stress Using Image Processing and Machine Learning Techniques", vol.9, no. 3S, July 2017.

[3] U. S. Reddy, A. V. Thota and A. Dharun, "Machine Learning Techniques for Stress Prediction in Working Employees," 2018 IEEE International Conference on Computational Intelligence and Computing Research (ICCIC), Madurai, India, 2018, pp. 1-4.

[4] T. Jick and R. Payne, "Stress at work," Journal of Management Education, vol. 5, no. 3, pp. 50-56, 1980.

[5] Bhattacharyya, R., & Basu, S. (2018). Retrieved from 'The Economic Times'.

[6] OSMI Mental Health in Tech Survey Dataset, 2017

[7] https://www.kaggle.com/qiriro/stress

[8] Communications, N.. World health report. 2001. URL: http://www.who.int/whr/2001/media_centre/press_release/en/.

[9] Bakker, J., Holenderski, L., Kocielnik, R., Pechenizkiy, M., Sidorova, N.. Stess@ work: From measuring stress to its understanding, prediction and handling with personalized coaching. In: Proceedings of the 2nd ACM SIGHIT International health informatics symposium. ACM; 2012, p. 673–678.

